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AD-A224 157

DOCUMENTATION PAGE

Form Approved  
OMB No 0704-0188  
Exp Date Jan 30, 1986

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY ELECTRIC		3. DISTRIBUTION/AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE. DISTRIBUTION UNLIMITED	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE 19 1990		4. PERFORMING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION DEPT OF ENTOMOLOGY, DCD&I WALTER REED ARMY INST. RESEARCH		6b. OFFICE SYMBOL (If applicable)	
6c. ADDRESS (City, State, and ZIP Code)  WASHINGTON, D. C.		7a. NAME OF MONITORING ORGANIZATION  WALTER REED ARMY INSTITUTE OF RESEARCH	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	
8c. ADDRESS (City, State, and ZIP Code)  FT. DETRICK, FREDERICK, MD 21701		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
11. TITLE (Include Security Classification) REVIEW OF NEW NEARCTIC MOSQUITO DISTRIBUTIONAL RECORDS NORTH OF MEXICO, WITH NOTES ON ADDITIONS AND TAXONOMIC CHANGES OF THE FAUNA, 1982-89.		10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO.      PROJECT NO.      TASK NO.      WORK UNIT ACCESSION NO.	
12. PERSONAL AUTHOR(S) RICHARD R. DARSIE, JR., AND RONALD A. WARD		13a. TYPE OF REPORT MANUSCRIPT	
13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day)	
16. SUPPLEMENTARY NOTATION		15. PAGE COUNT	
17. COSATI CODES FIELD      GROUP      SUB-GROUP		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) NEARCTIC MOSQUITO DISTRIBUTIONAL, ANOPHELES, TAXONOMIC CHANGES OF THE FAUNA. <i>RTS</i>	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) During the past 7 years, 24 species of Nearctic mosquitoes have had extensions to their known distribution in the form of 32 new state and province records in the United States and Canada. They are included in this report along with relevant references. Additionally, 3 new United States country records have been established, 3 species have had name changes, a new species of Anopheles and sibling species of another anopheline have been described. Details of these occurrences are covered.		20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS	
22a. NAME OF RESPONSIBLE INDIVIDUAL		21. ABSTRACT SECURITY CLASSIFICATION 22b. TELEPHONE (Include Area Code)	
		22c. OFFICE SYMBOL	

## REVIEW OF NEW NEARCTIC MOSQUITO DISTRIBUTIONAL RECORDS NORTH OF MEXICO, WITH NOTES ON ADDITIONS AND TAXONOMIC CHANGES OF THE FAUNA, 1982-89<sup>1</sup>

RICHARD F. DARSIE, JR.<sup>2</sup> AND RONALD A. WARD<sup>3</sup>

**ABSTRACT.** During the past 7 years, 24 species of Nearctic mosquitoes have had extensions to their known distribution in the form of 32 new state and province records in the United States and Canada. They are included in this report along with relevant references. Additionally, 3 new United States country records have been established, 3 species have had name changes, a new species of *Anopheles* and sibling species of another anopheline have been described. Details of these occurrences are covered.

### INTRODUCTION

The publication of Darsie and Ward (1981) included distributional records for the 166 species of mosquitoes known at that time to occur in the Nearctic Region, north of Mexico. It also reflected the taxonomic changes in the specific and supraspecific categories which had been delineated since the publication of Carpenter and LaCasse (1955). Ward and Darsie (1982) also accounted for other distributional changes up to and including 1982.

Since many new state and province records in the United States and Canada have been published over the last 7 years, it seemed appropriate to summarize them as well as enumerate new country records and pertinent taxonomic changes for the convenience of those interested in the field.

State- and province-wide mosquito records have been published by Belton (1983), Breeland and Loyless (1982), Darsie and Anderson (1985), Harrison et al. (1981), Means (1987) and Quickenden and Jamison (1979).

Other distributional records, identification information and limited bibliographies on a mosquito genus or geographical area are as follows: Andreadis (1988), Bennett (1983), Berry (1985), Berry and Craig (1984), Berry et al. (1986), Bosworth et al. (1983), Breeland (1982), Clark et al. (1986), Copps et al. (1984), Davis et al. (1984), Easton (1987), Easton et al. (1986), Haeger and O'Meara (1983), Hribar and Gerhardt (1985), Helson et al. (1980), Jakob et al. (1985), Jewell and Grodhaus (1984), Kaster (1981), LePrince (1982), Manning et al. (1982), Nasci et al. (1983), Nawrocki and Craig (1989), Pappas and Pappas (1983), Pratt (1952), Reiter (1986),

Reiter and Darsie (1984), Schoelfield and McIntosh (1984), Schoelfield et al. (1981), Steffan et al. (1980), Taylor (1983), Welch and Long (1984) and White and White (1980).

### NEW STATE AND PROVINCE RECORDS

There have been extensions of the known distribution of 25 species in 16 of the political subdivisions of United States, Canada and Bermuda. They are listed in Table 1 along with the species and the reference first reporting the finding.

Two geographical areas which have heretofore been excluded by us in considering the indigenous mosquito fauna, but which are clearly colonized by Nearctic species, are here being added. They are Greenland and Bermuda, insular territories in the Atlantic Ocean.

### NEW COUNTRY RECORDS

*Aedes (Stegomyia) albopictus* (Skuse): This species was apparently introduced into Harris County, TX, prior to 1985 in used tires shipped from Asia. It was first reported by Sprenger and Wuithiranyagool (1986) and Barnett and Davis (1986). It has since spread to many other states. Its known distribution now includes Alabama, Delaware, Georgia, Indiana, Kentucky, Mississippi, Missouri, North Carolina and Tennessee (Craven et al. 1988, Moore et al. 1988). Other states reporting its presence are Florida (Peacock et al. 1988) Illinois (Rightor et al. 1987), Louisiana (Darsie 1986), Maryland (Sweeney et al. 1988) and Ohio (Berry et al. 1988). It is also known from South Carolina (R. F. Darsie and S. Ferguson, unpublished data).

The discovery by Foster (1989) that *Ae. albopictus* has colonized tree holes is most significant because that is the natural habitat in its indigenous Oriental region. Also, Nawrocki and Hawley (1987) discussed its eventual distribution in North America.

*Aedes (Howardina) bahamensis* Berlin: This species was recognized as new (1969) by Berlin. The immature stages occur in the containers in

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Table 1. List of new state (USA), province (Canada) and Bermuda records which have occurred between 1980 and 1989.

Species	Location	Reference
<i>Ae. aegypti</i>	Rhode Island	Cookman and LeBrun (1986)
<i>Ae. albopictus</i>	Eastern USA, Texas	Sprenger and Wuithiranyagool (1986), Moore et al. (1988)
<i>Ae. bahamensis</i>	Florida	Pafume et al. (1988)
<i>Ae. communis</i>	Connecticut	Andreadis (1986)
<i>Ae. diantaeus</i>	New Brunswick	Maltais and Daigle (1984)
<i>Ae. dupreei</i>	Michigan	Cassani and Newson (1980)
<i>Ae. hendersoni</i>	Rhode Island	LeBrun et al. (1983)
	Manitoba	Brust (1979)
<i>Ae. infirmatus</i>	New Jersey	McNelly (1989)
<i>Ae. leucomelas</i> (= <i>implicatus</i> )	New Jersey	Maltais and Daigle (1984)
<i>Ae. melanimon</i>	North Dakota	Darsie and Anderson (1985)
<i>Ae. mitchellae</i>	Indiana	Copeland (1984)
<i>Ae. punctor</i>	Connecticut	Andreadis (1986)
<i>Ae. purpureipes</i>	California	Meyer et al. (1987)
<i>Ae. sollicitans</i>	Michigan	Cassani and Newson (1980)
<i>Ae. s. spencerii</i>	New Jersey	Ehrenberg (1983)
<i>Ae. sticticus</i>	Rhode Island	LeBrun et al. (1983)
<i>Ae. thelcter</i>	Arizona	Maloney and Reid (1989)
	California	Meyer et al. (1988)
<i>Ae. thibaulti</i>	New Jersey	McNelly (1984)
	Rhode Island	Cookman et al. (1985)
<i>Ae. triseriatus</i>	Manitoba	Gallaway and Brust (1982)
<i>An. barberi</i>	Massachusetts	Walker (1983)
<i>An. crucians</i>	Michigan	Cassani and Newson (1980)
<i>An. hermsi</i>	California	Barr and Guptavanij (1989)
<i>An. perplexens</i>	Michigan	Wilmot et al. (1987)
	Louisiana	Chapman and Johnson (1986)
<i>Cx. tarsalis</i>	Rhode Island	Jakob et al. (1986)
	Quebec	Gebara and de Oliveira (1986)
<i>Cs. impatiens</i>	Rhode Island	LeBrun et al. (1983)
<i>Cs. inornata</i>	Rhode Island	LeBrun et al. (1983)
	Bermuda	Darsie and Ward (present work)
<i>Cs. minnesotae</i>	Newfoundland	Mokry (1984)
	North Dakota	Darsie and Anderson (1985)
<i>Ps. ferox</i>	Rhode Island	LeBrun et al. (1983)
<i>Ps. howardii</i>	New Jersey	McNelly and Crans (1983)
	Iowa	Berry et al. (1986)

the Bahama Islands. Pafume et al. (1988) reported that it has been present in Florida since 1986 from eggs deposited in ovitraps; now it has been collected in tires with water from 37 locations in Dade and Broward counties (O'Meara et al. 1989). It is notable because it is the first species belonging to the subgenus *Howardina* to be reported from the United States.

*Anopheles* (*Anopheles*) *hermsi* Barr and Guptavanij 1989: This new anopheline was described from the coastal region of southern California by Barr and Guptavanij (1989). It is closely related to *An. freeborni* Aitken. Only larvae and pupae of *An. hermsi* can be separated from the latter. The authors point out that this species was apparently responsible for the transmission

of malaria in San Diego County, CA, in 1986. Some details of its biology and distribution had been previously given by Barr et al. (1988).

#### MOSQUITO FAUNA OF GREENLAND AND BERMUDA

**Greenland:** The first report of mosquitoes on this arctic island was made by Henricksen and Lundbeck (1917). They recorded the presence of *Ae. nigripes* (Zetterstedt) as *Culex nigripes* Zett. Some 50 years later Nielsen and Nielsen (1966) added *Ae. impiger* (Walker) as *Ae. nearcticus* Dyar and stated that it is locally more abundant than *Ae. nigripes*. A third species, *Ae. triseriatus* (Say) was collected by Messersmith (1971).

**Bermuda:** The following species have been collected in the islands of Bermuda: *Ae. aegypti* (Linn.) (Mayers 1983), *Ae. sollicitans* (Walker), *Ae. taeniorhynchus* (Wiedemann), *Cx. salinarius* Coq., *Cx. quinquefasciatus* Say (Williams 1956) and *Culiseta inornata* (Williston). One female of the last named species was identified by one of us (R.A.W.) and is here being reported from Bermuda for the first time. The specimen was collected from a house on Middle Road, Devonshire Parish, March 8, 1966, and has been deposited in the collection of the Bermuda Department of Agriculture, Hamilton.

#### TAXONOMIC CHANGES

*Aedes (Ochlerotatus) leucomelas* (Meigen): This species was formerly known as *Ae. (Ochlerotatus) implicatus* Vockeroth, until it was synonymized by Mezenev (1980) under *leucomelas*.

*Anopheles (Anopheles) quadrimaculatus* Say: This species is the traditional malaria vector in the eastern United States. Recently it was found to consist of at least 4 sibling species. They have been characterized both genetically and cytogenetically by Kaiser and Seawright (1987), Kaiser et al. (1988a, 1988b, 1988c), Lanzaro et al. (1988), Narang and Seawright (1988) and Narang et al. (1989a, 1989b). They are now designated as species A, B, C and D.

*Culex (Melanoconion) cedecei* Stone and Hair: This species was described by Stone and Hair (1968). It was subsequently synonymized with *Cx. opisthopus* Komp by Belkin (1969a, 1969b). Then Sirivanakarn and Belkin (1980) determined that *Cx. opisthopus* was conspecific with *Cx. taeniopus* Dyar and Knab so that its synonym, *Cx. cedecei*, was automatically transferred to synonymy under *Cx. taeniopus*. Recently, Weaver et al. (1986), as the result of isoenzyme and cross-mating experiments, have concluded that *Cx. cedecei* is indeed a distinct, incipient species.

*Culex (Culex) stigmatosoma* Dyar: This species had been called *Cx. peus* Speiser before Strickman (1988a) discovered that the holotype of *Cx. peus* is conspecific with *Cx. thriambus* Dyar. With the realization that *Cx. peus* was not a valid name for this species, the next available name was *Cx. stigmatosoma*, by which it was known in older literature (e.g., Dyar 1928).

*Culex (Culex) peus* Speiser: This is now the valid name for the species which was formerly known as *Cx. thriambus* Dyar, because Strickman (loc. cit.) found that the holotype of *Cx. peus* is identical to that of *Cx. thriambus*. He has described the holotype in detail. In order to assist in the use of the keys in Darsie and Ward (1981), Strickman (1988b) has provided a necessary couplet and name changes, as well as an

illustration of the salient adult female character, to distinguish *Cx. peus* from *Cx. stigmatosoma*.

The name *Cx. thriambus* has been used in the literature related to mosquitoes of the western United States for 67 years (1921-88). Eldridge and Harbach (1989) believe that there is good reason to preserve the name *thriambus*. They are proposing to suppress the name *peus* under the plenary powers of the International Commission of Zoological Nomenclature.

*Culex (Culex) pipiens* Linnaeus: Important studies on *Cx. pipiens* by Harbach et al. (1984, 1985) have resulted in neotype designations for *Cx. pipiens* and *Cx. molestus* Forskål. A thorough investigation of the latter, a physiological and behavioral variant, concluded that the name *molestus* has no taxonomic validity. It has been applied to populations which exhibit autogeny, stenogamy and anthropophily. Brodgon (1984) has determined that characters of the siphon can be used to distinguish larvae of the 2 taxa, *Cx. pipiens* and *Cx. quinquefasciatus* Say.

#### ACKNOWLEDGMENTS

The authors wish to thank J. A. Seawright for assistance in discussing the *Anopheles quadrimaculatus* complex, Christine Dahl for providing references on Greenland Culicidae and D. C. Williams and J. D. Mandeville for reviewing the manuscript.

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